MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2017 / 2018

DBM 5018 – BUSINESS MATHEMATICS

(B271 – 276, A111 - 113)

9 MARCH 2018
9.00 AM – 11.00 AM
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 3 pages with 4 questions.
2. Answer **ALL** questions. The distribution marks for each question is given.
3. Write your answers in the answer booklet provided.
4. All necessary working steps **MUST** be shown.
5. Key formulas are given in the appendix.

Question 1

a. Simplify $\dfrac{(6x^4y^3)^2}{9x^5y}$. (3 marks)

b. Given $P(x)=14x^3-x^2+1$ and $Q(x)=7x^3+3x^2-6$. Solve $(P-Q)(x)$. (2 marks)

c. Solve the linear inequality and represent your answer in the form of **interval notation.**

$$\frac{5(2-x)}{2}<-5$$ (4 marks)

d. Given the functions $g(x)=x-8$ and $h(x)=\dfrac{x}{3x-2}$.

i. Find the value of $(h\circ g)(x)$. (2 marks)

ii. From answer in part (i), calculate $(h\circ g)(10)$. (2 marks)

e. Given a demand function, $p+2q=100$ and a supply function, $3p=q+125$. Determine the market equilibrium point. (7 marks)

[TOTAL 20 MARKS]

Question 2

a. Given $\begin{bmatrix}x\\2\end{bmatrix}-3\begin{bmatrix}-1\\4\end{bmatrix}=\begin{bmatrix}2\\y\end{bmatrix}$. Find the value of x and y. (3 marks)

b. Given $\begin{bmatrix}2w & 4\end{bmatrix}\begin{bmatrix}3\\-2\end{bmatrix}=\begin{bmatrix}16\end{bmatrix}$. Find the value of w. (3 marks)

c. Given a linear system:

$$2x-3y+z=7$$
$$4x-5y-z=13$$
$$y+3z=-5$$

i. Write the linear system in the form of AX = B. (1 mark)

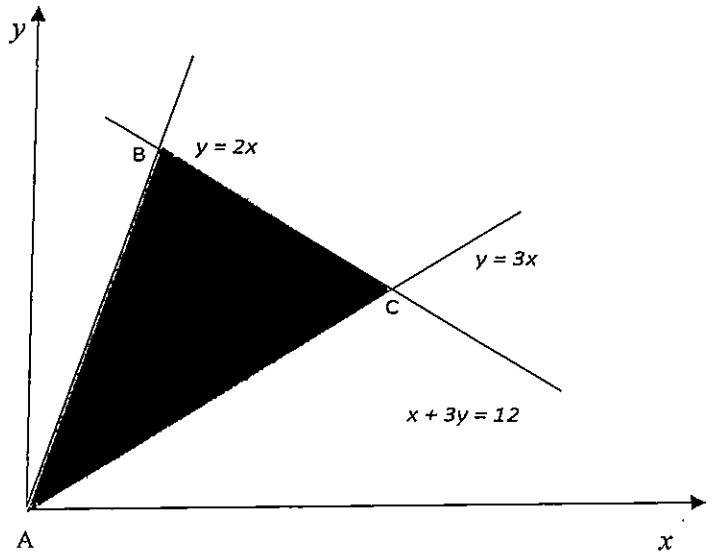
ii. Find $\begin{vmatrix}2 & -3 & 1\\4 & -5 & -1\\0 & 1 & 3\end{vmatrix}$. (2.5 marks)

Continued...

iii. Find the value of D_x, D_y and D_z. (7.5 marks)

iv. From answer in part (iii), find value of x, y and z. (3 marks)

d. Given a diagram as below:



i. State all inequalities that satisfy the shaded region R. (2 marks)

ii. Find the coordinate of B and C. Hence evaluate the maximum value if $Z = 4x + y$. (8 marks)

[TOTAL 30 MARKS]

Question 3

a. Rita wants to invest RM50 000 in a fund that can give her high return within 3 years. So she makes few comparisons among few offers as below.

Offer	Rate
A	Simple interest of 8% per annum
B	6% compounded semiannually
C	10% compounded quarterly

i. Calculate the interest earn for each offers. (12 marks)

ii. Which offer is the best for Rita? (1 mark)

b. Reece borrowed RM8 000 at 12% compounded monthly for 3 years. Find his monthly repayment. (7 marks)

[TOTAL 20 MARKS]

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Question 4

a. Find the derivative of the following functions.

i. $y = (x^2 - 4)(2x^3 + x)$ (5 marks)

ii. $y = \frac{2}{3}(1 + 4x^2)^6$ (4 marks)

b. The total cost function, $C(x)$ of producing x units of an item is given by $C(x) = 0.01x^3 + 1.2x^2 + 30x + 800$.

i. Find the marginal cost function, $C'(x)$. (3 marks)

ii. Evaluate $C'(30)$. (2 marks)

c. Find the following integrals.

i. $\int \left(\frac{2}{x^2} - 4x^3 + 4x^2 - 8x \right) dx$ (5 marks)

ii. $\int \frac{20}{(4x+5)^4} dx$ **[Hint: Use substitution rule]** (5 marks)

d. Evaluate $\int_0^2 (x^3 + 2x^2 - 3x - 4) dx$ (6 marks)

[TOTAL 30 MARKS]

End of Page.

APPENDIX 1: *Formulae*

Inverse of a 2×2 matrix

$$A^{-1} = \frac{1}{|A|}\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$

Determinant of a 3×3 matrix

$$\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = a_1\begin{vmatrix} b_2 & c_2 \\ b_3 & c_3 \end{vmatrix} - a_2\begin{vmatrix} b_1 & c_1 \\ b_3 & c_3 \end{vmatrix} + a_3\begin{vmatrix} b_1 & c_1 \\ b_2 & c_2 \end{vmatrix}$$

Cramer's Rule

$$\begin{aligned} a_1x + b_1y &= c_1 \\ a_2x + b_2y &= c_2 \end{aligned} \quad \textbf{then } x = \frac{D_x}{D} \textbf{ where } D = \begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix},\ D_x = \begin{vmatrix} c_1 & b_1 \\ c_2 & b_2 \end{vmatrix},\ D_y = \begin{vmatrix} a_1 & c_1 \\ a_2 & c_2 \end{vmatrix}$$

$$\begin{aligned} a_1x + b_1y + c_1z &= d_1 \\ a_2x + b_2y + c_2z &= d_2 \\ a_3x + b_3y + c_3z &= d_3 \end{aligned}$$

$$D = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}, \quad D_x = \begin{vmatrix} d_1 & b_1 & c_1 \\ d_2 & b_2 & c_2 \\ d_3 & b_3 & c_3 \end{vmatrix}$$

$$D_y = \begin{vmatrix} a_1 & d_1 & c_1 \\ a_2 & d_2 & c_2 \\ a_3 & d_3 & c_3 \end{vmatrix}, \quad D_z = \begin{vmatrix} a_1 & b_1 & d_1 \\ a_2 & b_2 & d_2 \\ a_3 & b_3 & d_3 \end{vmatrix}$$

$$x = \frac{D_x}{D}, y = \frac{D_y}{D}, Z = \frac{D_z}{D}.$$

Present Value Annuities

$$A = R\left(\frac{1-(1+r)^{-n}}{r}\right)$$

Future Values Annuities

$$S = R\left(\frac{(1+r)^n - 1}{r}\right)$$

Derivatives

$$\frac{d}{dx}[f(x)\cdot g(x)] = f(x)\frac{d}{dx}[g(x)] + g(x)\frac{d}{dx}[f(x)]$$

$$\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] = \frac{g(x)\frac{d}{dx}[f(x)] - f(x)\frac{d}{dx}[g(x)]}{[g(x)]^2}$$

Chain Rule

$$\frac{dy}{dx} = \frac{dy}{du}\cdot\frac{du}{dx}$$

Integration

$$\int [f(x) \pm g(x)]dx = \int f(x)dx \pm \int g(x)dx$$

$$\int x^n dx = \frac{x^{n+1}}{n+1} + C$$

$$\int_a^b f(x)dx = F(x)\Big]_a^b = F(b) - F(a)$$